

Claims

What is claimed is:

1. A method for making silica, comprising:
 - delivering a silica precursor comprising a pseudohalogen to a conversion site;
 - and
 - passing the silica precursor through a flame to produce silica soot.
2. The method of claim 1, wherein the pseudohalogen is selected from a group consisting of cyano, isocyano, cyanato, isocyanato, thiocyanato, isothiocyanato, selenocyanato, and isoselenocyanato.
3. The method of claim 1, wherein the silica precursor comprises silicon tetraisocyanate.
4. The method of claim 1, wherein the silica precursor is delivered to the conversion site in vapor form.
5. The method of claim 1, wherein the flame is formed by combustion of a fuel.
6. The method of claim 5, wherein the fuel comprises CH₄.
- 15 7. The method of claim 5, wherein the fuel comprises one selected from a group consisting of CO, (CN)₂, D₂, (CNO)₂, and combinations thereof.
8. The method of claim 1, wherein the flame is a plasma.
9. The method of claim 1, further comprising delivering to the conversion site a compound capable of being converted to an oxide of at least one member of a group consisting of B, Al, Ge, Sn, Ti, P, Se, Er, S, Ca, Ba, Y, Yb, Ta, La, Sb, and Bi.
- 20 10. The method of claim 1, further comprising delivering to the conversion site a compound capable of being converted to germania oxide.
11. The method of claim 10, wherein the compound comprises GeCl₄.
12. The method of claim 10, wherein the compound comprises a pseudohalogen.

13. The method of claim **10**, wherein the compound comprises germanium isocyanate.
14. The method of claim **1**, further comprising an environment at the conversion site
that is free of chlorine.
- 5 15. The method of claim **1**, further comprising delivering a fluorine-containing
compound to the conversion site and passing the fluorine-containing compound
through the flame to form silica soot doped with fluorine.
- 10 16. The method of claim **15**, wherein the silica precursor and the fluorine-containing
compound are delivered to the flame in gaseous form.
17. The method of claim **16**, wherein the fluoride-containing compound is selected
from the group consisting of CF₄, CF₄Cl_{4-x}, where x ranges from 1 to 3, NF₃, SF₆,
SiF₄, C₂F₆, and F₂.
18. The method of claim **16**, wherein the silica precursor is delivered in a gas stream
comprising an inert gas.
- 15 19. The method of claim **1**, further comprising depositing the silica soot on a deposition
surface.
- 20 20. The method of claim **19**, further comprising consolidating the silica soot into glass.
21. The method of claim **20**, wherein the deposition surface is provided by a rotating
mandrel.
22. The method of claim **21**, further comprising drawing the glass into a core cane.
- 20 23. The method of claim **19**, wherein depositing the silica soot on a deposition surface
comprises simultaneously consolidating the silica soot into glass.
24. A method for making germania-doped silica comprising:
delivering a silica precursor comprising a pseudohalogen and a germania
precursor comprising a pseudohalogen to a conversion site; and
25 passing the silica precursor and the germania precursor through a flame to
produce the germania-doped silica.

25. The method of claim 24, wherein the pseudohalogen is selected from a group consisting of cyano, isocyano, cyanato, isocyanato, thiocyanato, isothiocyanato, selenocyanato, and isoselenocyanato.

26. The method of claim 24, wherein the silica precursor comprises silicon 5 tetraisocyanate.

27. The method of claim 24, wherein the germania precursor comprises germanium isocyanate.

28. A method for making silica, comprising:

10 delivering a silica precursor comprising a pseudohalogen and an oxidant inside a heated tube to form silica; and
depositing the silica on an inner surface of the tube.

29. The method of claim 28, wherein the pseudohalogen is selected from a group consisting of cyano, isocyano, cyanato, isocyanato, thiocyanato, isothiocyanato, selenocyanato, and isoselenocyanato.

15 30. The method of claim 28, wherein the silica precursor comprises silicon tetraisocyanate.

20 31. The method of claim 28, further comprising delivering a compound capable of being converted to an oxide of at least one member of a group consisting of B, Al, Ge, Sn, Ti, P, Se, Er, S, Ca, Ba, Y, Yb, Ta, La, Sb, and Bi inside the heated tube to form doped silica.

32. The method of claim 28, further comprising delivering a compound capable of being converted to germania oxide inside the heated tube to form germania-doped silica.

33. The method of claim 32, wherein the compound comprises a pseudohalogen.

25 34. The method of claim 32, wherein the compound comprises germanium isocyanate.

35. A method for making fused silica, comprising:
delivering a silica precursor comprising a pseudohalogen to a conversion site;
passing the silica precursor through a flame to produce silica soot; and
depositing the silica soot onto a deposition surface, wherein the silica soot is
immediately consolidated into glass.
- 5
36. The method of claim 35, wherein the pseudohalogen is selected from a group
consisting of cyano, isocyano, cyanato, isocyanato, thiocyanato, isothiocyanato,
selenocyanato, and isoselenocyanato.
- 10
37. The method of claim 35, wherein the silica precursor comprises silicon
tetraisocyanate.
38. The method of claim 35, wherein the flame is formed by combustion of a fuel.
39. The method of claim 38, wherein the fuel comprises carbon monoxide.
40. An optical waveguide preform feedstock, comprising:
a pseudohalogen.
- 15
41. The optical waveguide preform feedstock of claim 40, wherein the pseudohalogen
is selected from a group consisting of cyano, isocyano, cyanato, isocyanato,
thiocyanato, isothiocyanato, selenocyanato, and isoselenocyanato.
42. An optical waveguide preform feedstock, comprising:
a pseudohalogen capable of being converted to germania oxide.
- 20
43. The optical waveguide preform feedstock of claim 42, wherein the pseudohalogen
is selected from a group consisting of cyano, isocyano, cyanato, isocyanato,
thiocyanato, isothiocyanato, selenocyanato, and isoselenocyanato.
44. The optical waveguide preform feedstock of claim 42, wherein the pseudohalogen
comprises germanium isocyanate.

45. A method for manufacturing an optical fiber preform, comprising:
delivering a silica precursor comprising a pseudohalogen to a conversion site;
and
heating the silica precursor to produce silica.
- 5 46. The method of claim **45**, wherein the silica precursor comprises tetraisocyanate.
47. The method of claim **45**, wherein the pseudohalogen is selected from a group
consisting of cyano, isocyano, cyanato, isocyanato, thiocyanato, isothiocyanato,
selenocyanato, and isoselenocyanato.
48. The method of claim **45**, further comprising a dopant compound.
- 10 49. The method of claim **48**, wherein the dopant compound comprises GeCl₄.
50. The method of claim **49**, wherein a fuel combusted to provide the heating comprises
CO.